Unit - V

5.1 WEB SERVER

Web Server is a software that uses HTTP(Hypertext Transfer Protocol) to send the web page requested by the user. Generally web server is a dedicated computer system used to host a website. The main objective of a web server is to store, process and deliver web page to the user. When user requests a website from the browser the web server delivers the website to the user. Apache web server is the most widely used web server in the world.

Apache Web Server

Apache is a free web server distributed under "Open Source" license. Apache Software Foundation is the community of developers who have developed Apache and maintain it. This is a cross platform web server. This can be installed and used in linux and windows operating systems. In the overall web servers available in the world 67% of the servers have apache server in it.

Configuring and using apache web server

Installing Apache on Linux

To install Apache software in linux OS๐ install the following steps are used.

1. Download Apache: http://httpd.apache.org/download.cgi from this website download the file with the name httpd-*NN*.tar.gz. In this *NN* denotes the version number
2. Extract: Download file is to be uncompressed before beginning installation. To uncompress use $ gzip -d httpd-*NN*.tar.gz command. To untarring the uncompressed file use the command $ tar xvf httpd-*NN*.tar. This will create a new directory in the current directory to untarr the files.
3. Configuring Apache Server: Open the directory using cd command. To select the default options during the installation of the server use ./configure command. In this command the --prefix option is given to specify the location of the apache server installation.

   ./configure --prefix=/program/apache \
4. Build: Based on the selected options and the installation location given the apache server software is build using the $ make command.
5. Install: Once the package is build it is installed using the $ make install command.
6. Start: Apache server is started by going into the installed directory and opening the bin folder and type the following command.

   $ *PREFIX*/bin/apachectl -k start
7. Test: To test if the Apache server is working properly http://localhost/ in a browser which will open the default apache server page. If the default server page is not shown then there is some problem with the installation of the apache server.

8. Stop: To stop Apache server stop command is used

   $ *PREFIX*/bin/apachectl -k stop

Installing Apache on Windows

1. Download Apache: http://httpd.apache.org/download.cgi from this website download the .msi file to be installed in windows system.
2. Installing: When .msi file is opened it will show the installation wizard. In the installation wizard select the default options and in the server name option give localhost. If the system already has a server then select the port number as 81 instead of 80. If port number is changed then we have to use that port number along with the localhost name to access the apache server. For example if the port number is given as 81 then the address to access the apache server page is http://locahost:81/.
3. Starting and Stopping Apache: In windows the apache server software is installed as a windows service. To start and stop the apache server we have to goto Control Panel -> Administrative Tools -> Services.

5.2 Open Source Software Tools

Most commonly used softwares in a computer are word processor, image editor and web browser. Some of the software available in open source are given below.

Word Processor

Word Processor is a software dedicated to create, save, manipulate and take printout of the document. In this the text editing operations include adding images to the document, creating table in the document, etc... Open Source word processor are.

- WPS Office: This software is similar to that of the Microsoft Word software in terms of user interface. This software provides 1GB cloud storage so that the user can save the documents in the cloud which can be accessed from anywhere in the world. Documents created in this software have .wps extension.
- LibreOffice: The user interface of this software is similar to that of 2007 Microsoft word. This software allows the usage of .doc and .docx extensions used in Microsoft word document. As this software is open source it has many plugin and templates which can be used effectively. This doesnot have the facility to store documents in the cloud.
- Apache OpenOffice: This software looks similar to that of LibreOffice software. In this software also the documents use .doc and .docx extension. The main difference between LibreOffice and OpenOffice is that, OpenOffice does not get regular updates.
- Google Docs: Google Docs can be used if the user has a Google account and internet connection. To open an existing word document, first we have to upload the document into google drive. This provide support for limited formatting.

Image Editor

Image Editor is a software used to edit photos. An image editing software has to have the following functions image enhancement, compress, resize, cut, copy, paste and color change. Some of the Open Source Image Editor are.

- GIMP: This is the most popular open source image editor. This has almost all the image editing features available in photoshop. This software has multiple plugins that can be utilized.
- Pixen: This is a special image editor software which is mainly used to make pixel arts. Pixel arts are nothing but creating icon and sprite.
- Krita: This software is developed for Linux Operating System. This has the basic image editing functions, the main functionality of this software is the creation of computer painting.

Browser

Browser is a application software used to access contents in World Wide Web. First ever browser used was WorldWideWeb created by Tim Berners-Lee during 1990. Similarly the first browser with GUI is NCSA Mosaic browser. Some of the Open Source browsers are.

- Firefox: This browser was created by Mozilla software community in 1998, in 2002 this was released for the public use. This used Gecko engine for accessing WWW. This is developed in such a way that it can be used in 91 languages. This browser is available in desktop and mobile platform.
- Chromium: This is the open source version of chrome browser. This was developed by Chromium Project community. This browser used Blink engine.
- Brave: This browser is designed in such a way to preserve the privacy of an user. This browser blocks the tracking code in some websites also it blocks the advertisements in the website. This was developed by Brave Software company. This uses Blink engine.

Open Source Processors

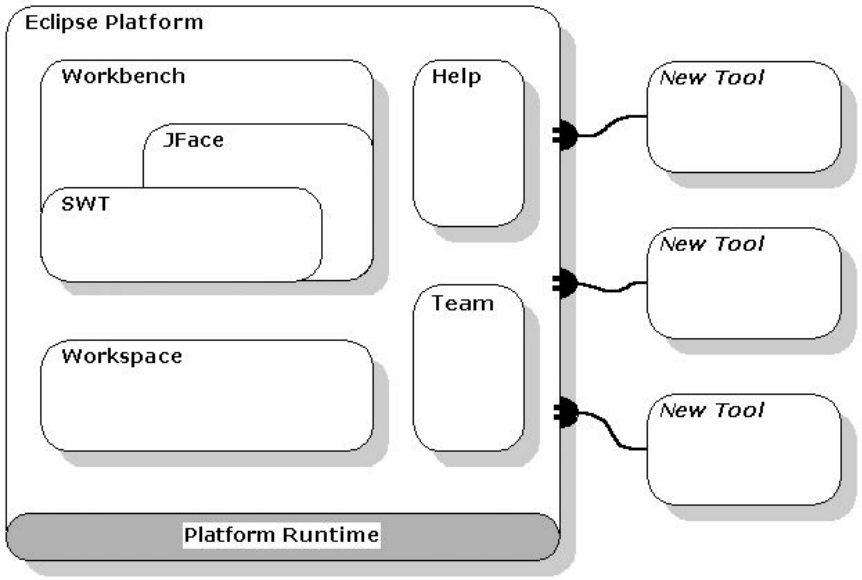
Similar to how a software is created and distributed without providing its source code to the users, the hardware design is also not provided to the users. The main part of a processor is its design and the usage of electronic components in it, it is generally not provided to the user. In an open source processor the design and the components used in the design are provided to the user. Some of the Open Source processor are.

- OpenSPARC: Sun Microsystems provided their UltraSPARC T1 chip multithread processor as open source in december 2005. In march 2006 UltraSPARC T1 and in 2007 UltraSPARC T2 processor were released as OpenSPARC T1 and OpenSPARC T2. Sun system provided the processors design, register transfer logic-RTL written in hardware description language and the script used to compile RTL code. This processor is a 64-bit 8-core multi-threaded processor.

- OpenRISC: This was developed by OpenCores community. This is mainly developed to be implemented as a processor for embedded systems. OpenRISC 1000 was the first introduced processor in this series it has been released in both 32-bit and 64-bits. OpenRISC 1200 was developed in 2000 by Damjan Lampret. Based on OpenRISC 1200 ORPSoC (System on Chip) was developed.
- Amber: This is based on ARM architecture, it is a 32-bit RISC processor. This was developed by OpenCores community. This project is the responsible for the development of a dedicated embedded system. Amber project released two versions, they are Amber 23 and Amber 25.

Introduction-Eclipse IDE Platform

Eclipse is a java based free Integrated Development Environment(IDE). It has various plug-ins which can be used to test and develop code different programming languages. Eclipse IDE was provides as an open soure project in 2001 by IBM. Lates it was managed by Eclipse Foundation. In 2016 Microsoft joined Eclipse Foundation so that visual studio was integrated in the Eclipse IDE. Eclipse platforms architecture is given below.



In Eclipse platform plug-in is a small functionality. This functionality is developed in java code and integrated into Eclipse IDE. The main use of the plug-in is they are used to integrate any programming language into the IDE so that it can be executed. Main parts of the Eclipse IDE

- Workspace: `This shows the project on which the user is currently working. When more than one project is active the workspace will show all the active projects the user is working on.
- Workbench: Eclipse's User Interface is called as workbench. This is developed usign SWT (Standard Widget Toolkit) and JFace. SWT consists of the API that provide the UI of the eclipse that is based on the Operating System. JFace handles the API that regards to the UI related to the programming.

- Team Support: Team repository is used to handle the version and configuration management of a project that is being develoed in Eclipse Platform. This allows us to handle multiple versions of the same project effectively.
- Help: This section provides the documentation related to the tools available in the eclipse IDE. This also provides links to online books.

Compilers

Compiler is a special program which is used to convert the source code written in a programming language into machine code. Some of the Open Source compilers are

- GCC: GCC (GNU Compiler Collection) compiler is developed by GNU Project. This is distributed under GNU General Public License to the users. This compiler was first developed to compile only C programs. Later it was develped to support C++, Fortran, Java and Ada programming language. GCC's main advantage is that it is a portable compiler. This allows cross-compilation.
- Free Pascal Compiler: This compiler is mainly used to compile Pascal and Object Pascal programing language. This was distributed as a free compiler under GNU General Public Licence. This allowed the compilation of Turbo Pascal adn Delphi languages which are based on Pascal. This compiler supports both 32-bit and 64-bit processor. Free Pascal's features are it compiles in a faster manner, This compiler linsk only the variable that are need for the current execution of the program. This compiler works on various operating system.
- Open64: This compiler was developed specifically for Itanium(Intel 64-bit) and x86 (AMD x86 64-bit) processors. This has the facility to compile C, C++ and Fortran laguages. The main features of this compiler is that it is highly effecient and will generate quality machine code.

Model Driven Architecture Tools

Model Driven Architecture is an approach used to develop software. This was released by Object Management Group (OMG) in 2005. In this tool to develop a software there is no need to write the code instead a model is generated. This model is platform-independent. Form the given model we can select the language in which the software is to be developed., based on the selected language the MDA tool will generate the source code. The main objective of MDA tool is to separate the architecture and design of a software. This allows us to use a single software design model which can be used to generate source code in any programming language. The MDA tool is used to develop, interpret, compare, align, measure and transform models. Types of MDA tool are

- Creation Tool: This tool is used to create models and edit the created models.
- Analysis Tool: This tool is used to analyse the created model for errors and rectify the errors that occur in the model.
- Transformation Tool: This tool is used to modify the models that are created and transform the model into source code.

- Composition Tool: This tool is used to compile multiple models into a single model.
- Test Tool: This tool is used to test the validity of the created model..
- Simulation Tool: This tool is used to simlate the working of the created model..
- Metadata management Tool: This tool is used to manipulte the metadata regarding the generated model. Metadata corresponds to information such as author, date of creation, etc.
- Reverse Engineering Tool: This tool is used to generate model from existing software through reverse engineering.

5.3 CASE STUDY

Government Policy Toward OpenSource (e-Governance)

Indian government released three main objectives regarding open source software in 2015, they are

1. Adoption of Open Source Software
2. Collaborative Application Development
3. Open Application Programming Interfaces

Adoption of Open Source Software

National Policy on Information Technology 2012's main motive is to "Adopt open standards and promote open source technology". Based on this motive the government of india has adviced all the gvernment related organizations to use open source software. This is mainly intended to be implemented on e-Governance systems. This allows the e-Governance system's source code to be availabel to all the users so that they can understand it and contribute for the betterment of the system.

Collaborative Application Development

This objective allows us to develop the e-governance application in a faster manner. To implement this type of collaborative application development the government has proposed to develop an online source code repository similar to that of GitHub and SourceForge. This collaborative approach helps to reduce the e-governance software development cost and time also this provides high qulaity and security in the software development.

Open Application Programming Interfaces

Indian Governments Digital India's main motive is to allow the people to access the government related services from any platform (website, mobile, common service center). This needs all the services to be interlinked to one another using open API's. One example for this is the DigiLocker application which allows th epublic to store the informations such as aadhaar card details, driving license details, school certificate details,etc...

Wikipedia as an Open Source Project

Wikipedia is designed to store important infromations in a single place on the web. Wikipedia is an open source project, this was developed by global group of volunteers. In reality wikipedia is not an open source software but it is a free place where anyone can add information about anything.